Conceptualization of Non-Financial Defined Contribution Systems

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IN THEIR PAPER IN THE *JOURNAL OF ECONOMIC LITERATURE*, Assar Lindbeck and Mats Persson (2003) provide a three-dimensional classification of pension systems. One dimension is seen in the contrast between defined contribution (DC) and defined benefit (DB) systems based on adjustment methods to financial realizations. Defined contribution systems adjust benefits, while defined benefit systems adjust revenues. This distinction is really a continuum in that one can adjust a combination of the two. This could be done as part of automatic adjustment, as has been proposed for the United States by Peter Diamond and Peter Orszag (2004), who proposed that roughly half the automatic adjustment for the impact of life expectancy increases on social security finances be done by benefit reductions and roughly half by payroll tax rate increases. Or a combined approach can be done in the course of legislation, as in the 1983 reform of U.S. social security (see Light 1985). When it is done by legislation, then the picture can become even more complicated, in that benefits for some can be increased while the general level of benefits is decreased. In addition to arguing that this dimension be considered a continuum, I wonder if it might not be better to use the phrase "adjustments to stochastic realizations," recognizing that pure DC and pure DB systems are just two points in this continuum.

Lindbeck and Persson's second dimension is the degree of funding, which is a continuous variable as well. This dimension is also more complex in that there is the important distinction made by the source of the funding. Analysts are very aware of the difference between assets that are politically committed to paying for benefits and assets that also have been accumulated in a way that contributes to national savings. Thus there is further complexity in this dimension, as well.

They refer to their third dimension as actuarial—the extent to which there is a tight link between paying taxes and getting benefits. This is clearly tied to labor market incentives and is also more complex than they describe. One can think of a system that is a combination of a flat benefit and a benefit proportional to the accumulation of taxes paid. Then the relative sizes of the two portions indicate how distortive the labor incentives are (distortive in the sense that this would interfere with the fundamental welfare theorem if there were no other violations of the conditions needed for the theorem to hold). This example makes it clear that, as with the other two dimensions, there is no sense that "more actuarial" is necessarily better (since income distribution matters as well as efficiency), just as there is no sense in which "more funded" is necessarily better or further along on the defined benefit defined contribution dimension (in one direction or the other).

But there are other ways in which the determination of benefits can differ from a defined contribution system (which may not be distortive in the sense I used the term

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above). There is the issue of the weights on different years of earnings in determining benefits— the difference between accumulating at a market interest rate in a DC system and an internal rate of return in an NDC system. Actually this comparison needs to be adjusted if it is to be orthogonal to the other dimensions. That is, the comparison ought to be done holding constant the present value budget constraint for a given cohort. In this case, the NDC approach is expected to weight earlier years less than the market interest rate does and weight later years more than the market interest rate does. Use of the market interest rate involves no distortion if the cohort breaks even on taxes and benefits, there is no redistribution within the cohort, and there are no other labor market distortions. But these conditions do not hold generally. Indeed, the use of progressive annual income taxes would make the NDC approach less distortive since it would tend to balance the rise in marginal income taxes that comes with the usual age-earnings profile. That is, with an upward sloping age-earnings profile and progressive annual income taxes, the sum of explicit income tax and implicit social security tax can well be smoother with NDC than with DC.

It is common to observe that the redistribution to earlier cohorts distorts the labor supply of later ones. In a two-period overlapping generations (OLG) model where the first generation gets a surprise benefit after retirement and all later cohorts pay for it, this is the full story. In practice, early generations are treated more generously over an extended period, thereby affecting labor supply of both recipients and payers of intergenerational redistribution. That is, early cohorts get their labor supplies subsidized, while later ones get them taxed. Given a presumption of a preference for relatively stable tax rates, this is suggestive of a distortion, but a more complex one than in the simple two-period model.

The same issue arises in systems that use a shorter averaging period—the last n years rather than all years, for example. Then, with a break-even comparison, there is taxation of earnings in earlier years that do not count for benefits, and subsidization in later years, which produce so much in benefits as to more than offset the taxes paid. The story becomes even more complex in a setting of individual uncertainty and the use of some measure of highest earnings rather than last earnings. That is, different benefit rules, combined with different stochastic structures on earnings possibilities, will yield different degrees of uncertainty about retirement benefits. I am not convinced that *actuarial* is a good term for this dimension since it is an intervention in the labor market that affects efficiency, individual insurance, and redistribution. Such a term is not used in considering the degree of progressivity of the income tax and it is not clear it is helpful to do so here. This is not to suggest a disagreement with Lindbeck and Persson's identification of labor market incentives as a very important third dimension when classifying systems—just that this dimension, like the other ones, is itself multidimensional, not a single point in a one-dimensional scale. Perhaps "labor market incentives" is a better phrase than "degree actuarial."

Thus I would rename their three dimensions, with new names of "adjustments for stochastic realizations," "degree of funding," and "labor market incentives." Renaming is essentially agreeing with the value in this tripartite way of approaching the effects of social security designs.

In this setting, a pure NDC does all its adjustments on the side of benefits and none on the side of taxes, has limited funding through its buffer stock of assets, and has good labor market incentives. Where each of these three choices is, relative to optimality for some particular country's initial position, is a hard question to answer. There is no basis for claiming a general optimality for any of the positions of a pure NDC system in any of the three dimensions.

To put an NDC system into context, let us briefly review how other systems work. If there is no system, an individual who is doing lifecycle optimization saves, with different savings rates at different times; invests in some combination of assets; and at some time purchases an annuity of some form, with at least some of the accumulation. (Rolling purchase of annuities would be better insurance if available at equivalent pricing.) Such a person adjusts the level of savings over time in response to both the realizations of returns on assets and the realized earnings levels.

A mandatory DC plan preserves the individual character of budget balance and the reliance on market pricing of assets and annuities and the bearing of the risk in both asset returns and earnings trajectories. A mandatory DC system does not typically attempt to adjust the savings rate to realizations. The uniform savings loses out on both the liquidity needs behind an ex ante plan of varying savings rates and the ability to adapt savings to experience. But there is room for varying savings if the mandatory rate is not too high— below a savings level adequate for financing all of appropriate retirement income. Redistribution can be combined with this, either through a separate arrangement (such as minimum incomes) or within the system by transferring between accounts.

A corporate DB plan typically relates benefits to a history of earnings and uses projected needs to determine assets to be accumulated. If there is government regulation of financing, it does not apply to an individual but to the plan as a whole. Contribution rates would be continuously adjusted if there was a serious attempt to preserve full funding. In practice, corporations adjust both benefit formulae and contribution rates in response to realizations of both corporate earnings and pension system experience. Moreover, the wage levels themselves are among the candidates for responding to the risks in both pension experience and corporate earnings, subject of course to labor market responses.

A mandatory national DB often differs from corporate DBs in the formula chosen for relating benefits to the history of earnings, although it need not (some corporate plans use the entire history of earnings in determining benefits). It also can differ from a regulated corporate plan in the target level of funding. Put differently, the risk implications of the level of funding are different for corporate and national plans since conditions leading to corporate bankruptcy are different from conditions resulting in countries repudiating benefits.

An NDC is a hybrid with two creative innovations. One is that benefits depend on taxes paid, not earnings. The second is that the NDC plan is discussed in terms of a DC vocabulary, not a DB vocabulary. In the context of an unchanging tax rate, the first innovation is of little significance. The second innovation must have been helpful in achieving political consensus for reform in Sweden, but Axel Börsch-Supan, (2005) has argued that it would not have been helpful in Germany.

If followed closely, a pure NDC has one less degree of freedom than does a similarly constructed DB. An NDC is supposed to provide benefits for different cohorts that have a present discounted value (PDV) that equals the value of the account, using the internal rate of return (IRR) for a discount rate. A DB system could adjust benefits for successive cohorts that followed a similar rule for relating relative benefits to relative life expectancies. But it has a degree of flexibility in setting the relationship between benefits and earnings. In practice, the Swedish NDC used a degree of flexibility in choosing to use period mortality tables rather than cohort ones, either projected or adjusted based on experience, as does a (CREF) annuity pioneered by TIAA-CREF in providing annuities for university employees. Instead, the Swedish system does its adjustment in two ways. One is the level of assets to provide the system at the start. The other is the automatic adjustment mechanism.

In contrasting a well-designed DB or NDC system with a DC system, we see the potential in the DB to improve social welfare by redistributing income and providing insurance for earnings through a progressive benefit formula. (Differently designed redistribution is potentially present in both DC and NDC, but is more in keeping with the approach of a DB.) We see the potential in both the DB and the NDC to provide more within-cohort risk sharing by relying less on rates of return, (rates of return also being earned on individually held assets). We see differences among the three in the weighting of earnings in different years in the determination of benefits. There is no sense in which an NDC is better than a well-designed DB. Instead I think of it as a way to get a DB system that is better designed than many current or former DB systems.

There is wide agreement on several properties of a good system. A country should have one system—not separate systems for separate groups, with political power affecting the relative treatment of different workers. Benefits should be based on at least a large fraction of a career. A system should preserve projected balance, either through fully automatic adjustments or some combination of some automatic adjustments and periodic legislation.[1] A system also needs to have a reliable process for projecting the future workings of the system—both its financial position and its fulfillment of its social insurance goals. And not too much of the cost of reaching balance should be shifted onto generations in the distant future. Does an NDC help countries not meeting these conditions meet them? It may, but it need not.

It has been claimed that it is a virtue of the Swedish system that there is no reliance on forecasts. I think this is not necessarily a virtue. In a fully privatized system, the market engages in projections when deciding how to price annuities and when committing to rates of return on long-lived investment options that have given rates of return. I see nothing inherently problematic in using projections in determining a balance between benefits of different cohorts. I also note that with a private market system with sensible workers, workers would be adjusting their savings rates to realizations of their experience in financing retirement incomes. Moreover, the adjustment rules that do not use an explicit forecast can be seen as merely relying on a naïve forecast.

It should be noted that the value of one kronor in an NDC account is not equal to the value of one kronor in a funded DC account. Since the NDC kronor is earning a lower rate of return than the DC kronor, it is worth less. Thus the claim that workers know the value of their accounts is wrong. It is good for workers to be informed about anticipated monthly benefits. Since there is speculation that workers overvalue lump sums relative to the flows they can finance, more information is definitely useful. Moreover, the dependence of the value of the accumulation in an NDC account on future legislated returns means that accounts with the same accumulation would have different values in countries with different anticipated growth rates. Thus wider use of NDC does not provide ready transfers between countries without detailed actuarial calculations of assets that would need to be transferred to accompany a transfer of liabilities.

An NDC system faces a choice between how it allocates risk to different participants at different times and how likely it is to have a need for an adjustment. For example, recognizing the higher risk aversion of retirees than of workers, it makes sense to have benefits in force not fully subject to the fluctuations in taxable earnings.

In sum, an NDC system is likely to be pretty good—serving its social insurance goals well. It leaves open several choices about design, choices that should be based on the consequences of choice, not some notion of an ideal NDC in light of NDC philosophy. The choices in the design of benefits may be particularly important—single or joint-life annuities, choice of indices for adjusting benefits, and the time shape of benefits more generally.

These choices should reflect both the impact on retirees and the labor market incentives. On a break-even basis, steeper benefits that start lower may be particularly useful for discouraging retirements if they are thought to be occurring too early. Related is the choice of whether to have a retirement test for a few years after initial eligibility for retirement benefits. Such a test affects the time shape of consumption beyond the early entitlement age as well as retirement decisions. Although an NDC is likely to be a pretty good system, it does not make sense to oversell it, claiming excessive virtues relative to alternatives.

References

Börsch-Supan, A. 2005. "What Are Non-Financial Defined Contribution Systems? What Do They Bring to Reform Strategies?" In *Pension Reform: Issues and Prospects for Non-Defined Contribution (NDC) Schemes*, ed. R. Holzmann and E. Palmer, chapter 3. Washington, DC: World Bank.

Diamond, P. A. 2004. "Social Security." *American Economic Review* 94(1): 1–24.

Diamond, P. A., and P. R. Orszag. 2004. *Saving Social Security: A Balanced Approach.* Washington: Brookings Institution Press.

Light, P. C. 1985. *Artful Work: The Politics of Social Security Reform*. New York: Random House.

Lindbeck, A., and M. Persson. 2003. "The Gains from Pension Reform." *Journal of Economic Literature* XLI (1, March): 74–112.

Note

1. For discussion of different ways of achieving balance—of allocating the risk associated with realizations of economic equilibria—see Diamond (2004).